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AUTHOR(S):

NAKAMOTO, KOHICHI; TANAKA, AKIRA; KIKUCHI,  
SHUNJI; NIO, YOSHINORI; HENMI, KIMIO

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## Clinical Assessment of Ultrasonography in Diagnosis of Abdominal Tumors

KOHICHI NAKAMOTO, AKIRA TANAKA, SHUNJI KIKUCHI,  
YOSHINORI NIO, and KIMIO HENMI

Department of Surgery, Akoh City Hospital (Director : WASHIROH OGINO)

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The ultrasonography has become one of the routine diagnostic procedures in recent years. The purpose of the present study is to assess clinically the diagnostic faculty of this method in diagnosis of abdominal tumors.

### Methods

The sonar was Diasonograph type Aloka SSD 60 equipped with a transducer of 10mm calibre, and ultrasonic frequency of 2.25 MHz was used. The patient's skin was covered by a thin layer either of paraffin or of olive oil in order to gain better acoustic coupling. Scanning was done by manual movement of the transducer at the speed of about 5cm per second and echoes were displayed on a storage oscilloscope. The storage was recorded with a Polaroid camera.

### Patient material

From about 200 patients examined by ultrasonography in our department during the last two years, eight representative patients were selected and presented herein in order to assess the diagnostic faculty of ultrasonography for abdominal tumors, especially cystic tumors.

The tumor was diagnosed as being cystic when no echo was obtained by scanning with a highly sensitive level, namely, +6dB higher sensitive level than that was required to visualize the normal liver<sup>6)</sup>.

**Case 1.** A 6-month-old boy was admitted because of a walnut-sized abdominal tumor in the right upper quadrant. His prenatal period and birth were normal. Four months prior to this admission the patient had jaundice and was hospitalized in the Department of Pediatrics Kyoto University for three weeks with a diagnosis of hepatitis. Physical examination on admission revealed poor nourishment, though his development was normal.

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**Key words :** Ultrasonography, Abdominal tumors, Cystic patterns.

索引語 : 超音波断層法, 腹部腫瘤, 嚢胞性エコー.

Present address : Department of Surgery, Akoh City Hospital 3-57 Kariya, Akoh, Hyogo, 678-02, Japan.

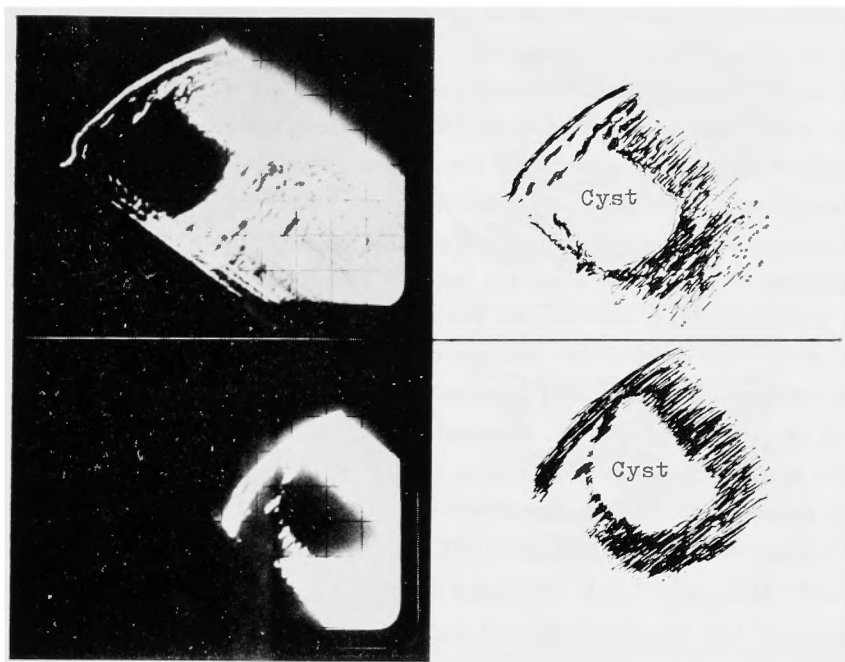


Fig. 1 Choledochal cyst Supine transverse sections over the region of the liver at the level of L1-L 2.

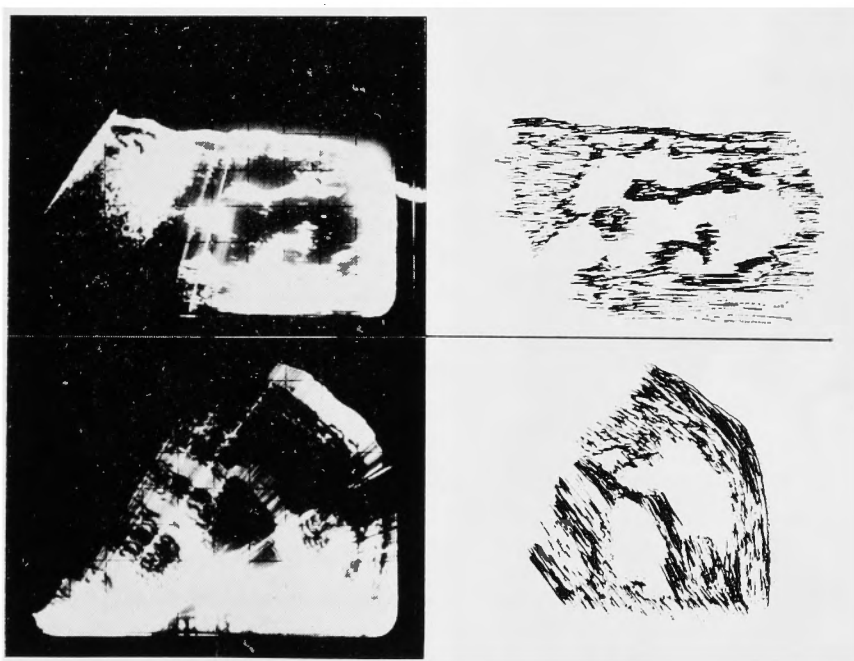


Fig. 2 Hydronephrosis Longitudinal section of the abdomen in the posterior axillary line. (Above)  
Transverse section of the abdomen at the level of L2-L3. (Below)

Findings of laboratory examination were as follows : 39%; WBC, 11,900; GOT, 46; GPT, 25; LDH, 403 ; total Bilirubin, 0.4mg/dl. Neither the bile duct nor the gall bladder was visualized on DIC. Abdominal aortography and upper GI contrast study demonstrated a space occupying mass behind the duodenum. A transverse ultrasonic scanning over the right upper quadrant showed an acoustically translucent tumor below the liver (Fig. 1), which was diagnosed as a choledochal cyst ; the diagnosis being confirmed by surgery.

**Case 2.** A 2-year-old boy was admitted because of a fist-sized tumor in the left lower quadrant of the abdomen. IVP failed to show the left kidney and ureter. Ultrasonic scanning sliced vertically and horizontally over the left kidney region demonstrated an acoustically translucent mass which was divided into some portions by septa (Fig. 2). Hydronephrosis due to congenital stricture of pelviureteral junction was confirmed by surgery.

**Case 3.** A 71-year-old female was admitted with a chief complaint of jaundice. Physical examination revealed a plum-sized tumor in the right upper quadrant of the abdomen. Laboratory examination showed the followings : Ht, 32% ; Hb, 11.1g/dl ; total Bilirubin, 6.9mg/dl ; direct Bilirubin, 5.6mg/dl ; GOT, 63; GPT, 59; ChoE, 0.42;  $\gamma$  GTP, 165mu/ml; LAP 395 GR ; ALP, 52.7 K.AU. DIC failed to show the biliary tract, and PTC demonstrated the distended bile ducts and the gall bladder. It was suspected that a gallstone obstructed the distal portion of common bile duct (Fig. 3). A longitudinal scanning along the

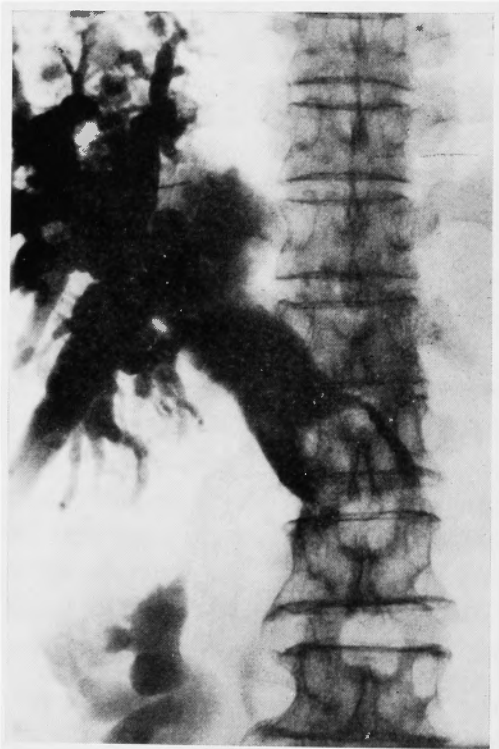


Fig. 3 PTC demonstrated the distended bile ducts and the gall bladder.

right mamillary line demonstrated the dilated gall bladder and common bile duct; the latter being obstructed by a heterogeneous mass (Fig. 4). These findings suggested a pathological condition of the common bile duct occluded by the invasion of a pancreatic cancer. This diagnosis was confirmed by surgery.

**Case 4.** A 81-year-old male was admitted with a chief complaint of jaundice. Three months prior to the admission he began to complain of vomiting and loss of body weight. On physical examination he was found to have a goose-egg-sized tumor in the right upper quadrant of the abdomen. Results of the laboratory examination on admission were as follows : Ht, 32%; Hb, 10.9g/dl ; total Bilirubin, 20.8mg/dl ; direct Bilirubin, 17.3mg/dl ; GOT, 131; GPT, 77; ChoE 0.30;  $\gamma$  GTP, 494mu/ml ; LAP, 386 GR ; ALP, 148.5 K.AU. DIC failed to show the biliary tract, and PTC revealed a markedly distend-

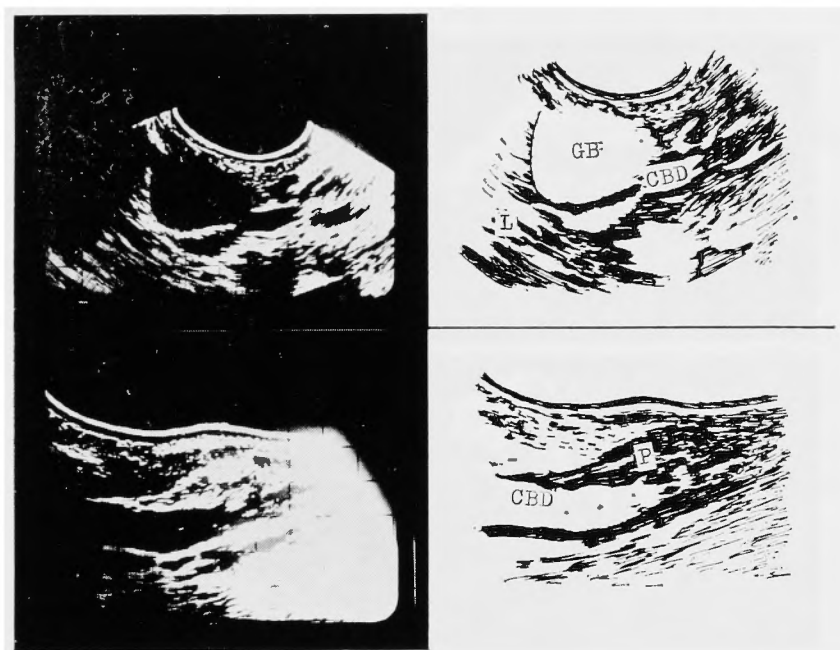


Fig. 4 Pancreas cancer Longitudinal sections of the abdomen in the right mamillary line.  
GB : Gall bladder CBD : Common bile duct P : Pancreas L : Liver

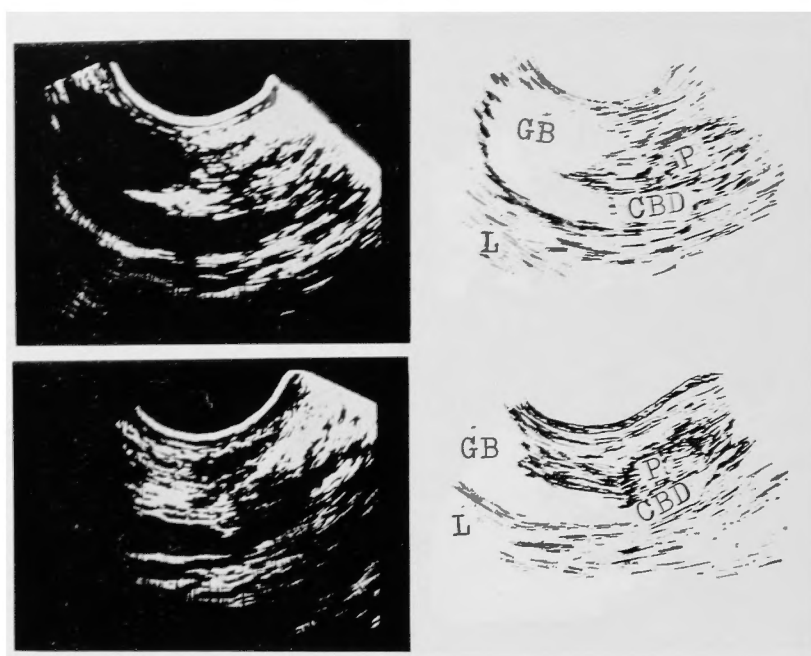


Fig. 5 PTC revealed a markedly distended bile duct, which looked squeezed and irregular at the distal portion of it.

ed bile duct. The distal portion of the common bile duct looked squeezed and irregular (Fig. 5).

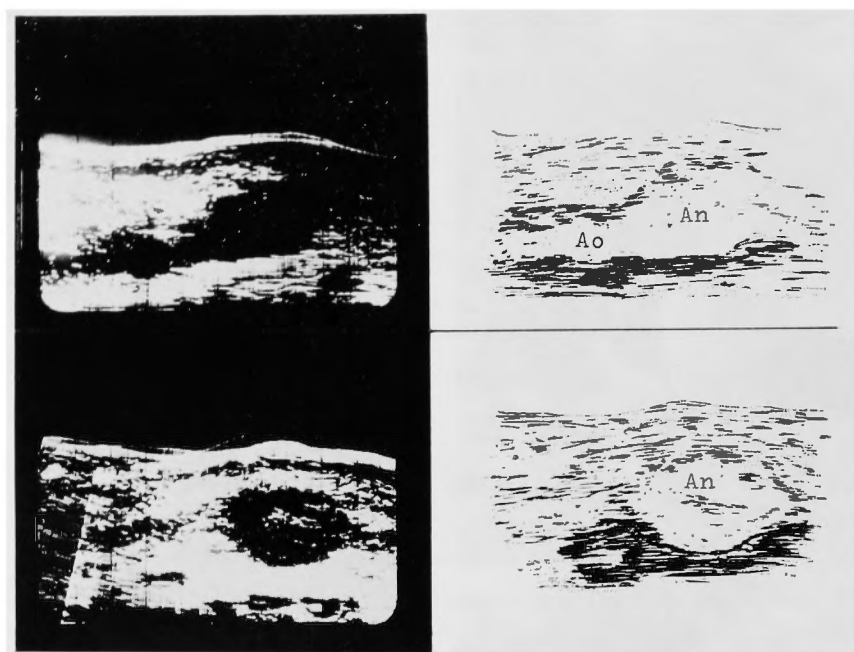
A longitudinal scanning along the right mamillary line demonstrated the markedly distended gall bladder and common bile duct; the latter being obstructed by a heterogeneous mass. These findings were interpreted as a pancreatic cancer invading and obstructing the common bile duct. The diagnosis was confirmed by surgery (Fig. 6).

**Case 5.** A 78-year-old male was admitted with pain in the lower abdomen. Physical examination showed a pulsatile mass in the lower abdomen. A vertical scanning along the abdominal aorta showed an abdominal aortic aneurysm which measured 6 cm in diameter at its broadest point, and became narrow both proximally and distally (Fig. 7). Abdominal aortography confirmed the diagnosis.



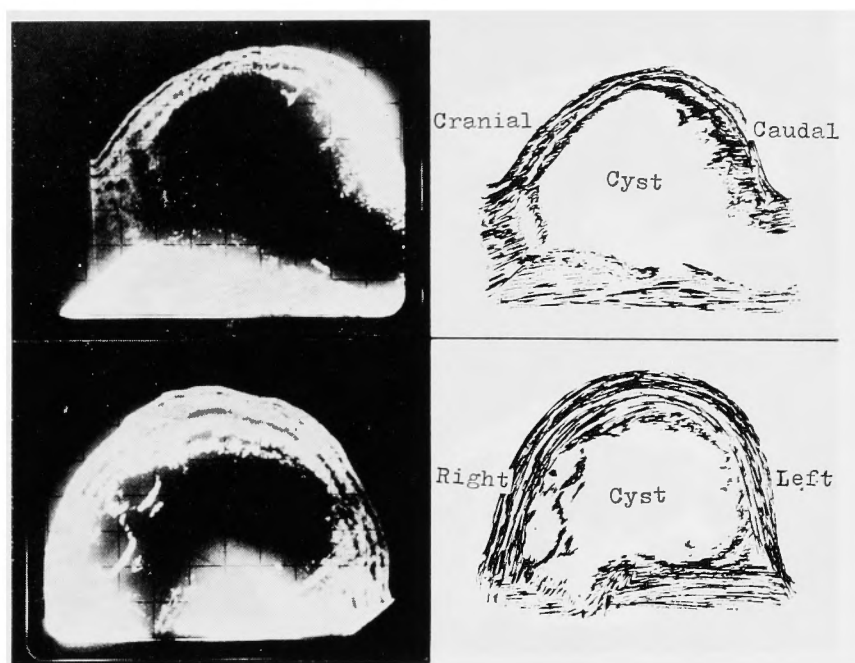
**Fig. 6** Pancreas cancer Longitudinal sections of the abdomen in the right mamillary line.

GB : Gall bladder    CBD : Common bile duct    P : Pancreas    L : Liver

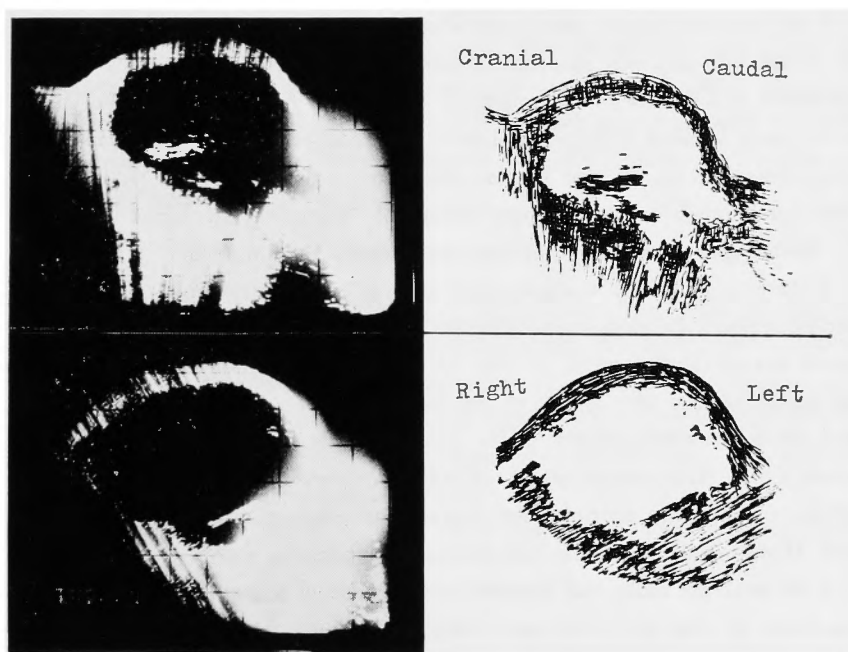


**Fig. 7** Abdominal aortic aneurysm Longitudinal sections along the abdominal aorta.

Ao : Aorta    An : Aneurysma



**Fig. 8** Ovarian tumor Longitudinal section of the abdomen in the midline. (Above) Transverse section of the abdomen at the level of the iliac crest. (Below) C : Cyst:



**Fig. 9** Neurogenic sarcoma Longitudinal section of the abdomen in the midline. (Above) Transverse section of the abdomen 2cm above the level of the iliac crest. (Below)

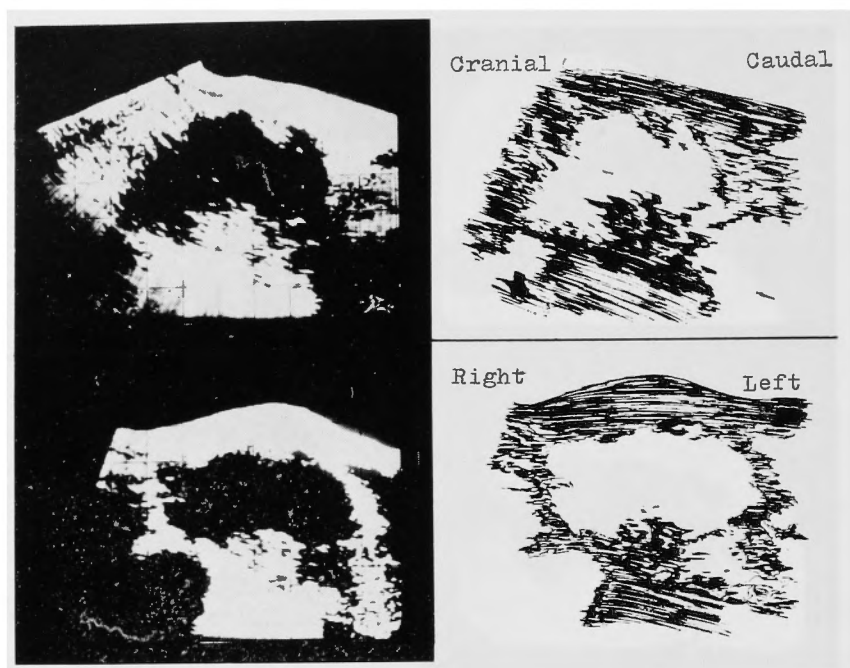


Fig. 10 Fibrosarcoma Longitudinal section of the abdomen in the left mamillary line. (Above)  
Cross section 3cm above the umbilicus. (Below)

**Case 6.** A 69-year-old female was hospitalized with a chief complaint of abdominal distension. The celiac and superior mesenteric arteriography revealed a space occupying lesion in the abdomen and lateral displacement of intestines. A vertical and horizontal scanning over the abdomen showed a large acoustically translucent lesion which occupied almost all part of the abdominal cavity and was divided into some portions by septa (Fig. 8). This lesion was interpreted as an ovarian tumor. A huge ovarian tumor weighing 10kg was resected. Histological specimen was pseudomucinous cystadenoma.

**Case 7.** A 74-year-old male was admitted with a chief complaint of a growing tumor in the lower abdomen. Barium enema revealed upward displacement of the sigmoid colon. IVP showed lateral displacement of the bilateral ureters and the bladder. Vertical and horizontal scanning over the region of the lower abdomen demonstrated a translucent mass, which had many scattered echoes in its posterior part (Fig. 9). The mass was suspected of a tumor filled with either blood or necrotic tissue. Laparotomy disclosed a retroperitoneal tumor invading surrounding organs, and containing blood and liquefied necrotic tissue in it. Histological specimen was neurogenic sarcoma.

**Case 8.** A 20-year-old male was hospitalized because of a gooseegg-sized tumor in the left upper quadrant of the abdomen and the loss of body weight. Upper GI contrast study revealed upward and forward displacement of the stomach. A cyst of the pancreas was suspected by celiac and superior mesenteric arteriography. Vertical and horizontal scanning



over the region of the tumor showed an acoustically translucent structure in the tumor and many scattered internal echoes in the dorsal part of the tumor (Fig. 10). The lesion was presumed to be a sarcoma. Laparotomy disclosed a retroperitoneal sarcoma invading the abdominal aorta and the left renal artery and vein and containing both blood and necrotic tissue in it. It was impossible to remove the tumor. Histological specimen was fibrosarcoma.

### Discussion

An ultrasonic scanning has brought a new method of investigation in clinical fields<sup>1)2)</sup>  
<sup>3)7)</sup>. It has the following advantages and disadvantages<sup>4)</sup>.

#### Advantages

1. It is a non-invasive and repeatable procedure.
2. No preparation is required.
3. The pictures are formed not according to the specific gravity but according to the acoustic property of the tissue.
4. It provides sectional views.
5. There is no contraindication.

#### Disadvantages

1. Its useful application is limited only to those organs which are not covered by air or bone
2. Skill is required to gain a fine view.

Among the eight cases reported above, in the four cases (No. 3, 6, 7 and 8) better diagnostic information was obtained by ultrasonic scanning than by other diagnostic measures. It was concluded from our experiences that ultrasonic scanning established its usefulness in diagnosis of abdominal tumors, especially of the lesions of the biliary system, the ovarium, and the retroperitoneal structures.

### Summary

Presented are eight cases with abdominal tumors which were examined by ultrasonography. Abdominal tumors of cystic configurations were diagnosed more accurately by ultrasonography than by other diagnostic measures.

It is anticipated in near future that ultrasonography will be widely used and provide much more accurate informations with development of methods such as color display<sup>5)8)</sup> and computerized simultaneous ultrasonic scanning<sup>9)</sup>.

The gist of this paper was reported at the 126th Meeting of Kinki Surgical Association, Kobe, November 17, 1979.

### Acknowledgement

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## 和文抄録

## Cystic pattern を呈した腹部腫瘍の 超音波断層に於ける診断的意義

赤穂市民病院外科

中元 光一, 田中 明, 菊池 俊二  
仁尾 義則, 辺見 公雄

超音波断層法は、補助的診断法として、広く普及しつつある。我々は、接触複合操作法にて、Cystic pattern を呈した腹部腫瘍8例を供覧し、その診断的意義を検討した。本診断法は、特に胆道系、卵巣、後腹膜腫瘍において、腫瘍の大きさ、形、内容等の性状

に関し、十分に満足できる情報を提供し、有力な診断法と思われる。装置の操作上の技術的な問題点を克服するとともに、無病無害という長所を生かし、スクリーニングとしてだけでなく、精密検査としても、幅広く、臨床に応用されることが、望まれる。